

Analysis of Dynamic Acoustic Source Positioning: An Autonomous Swarm Approach

by

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Submitted to the Department of Mechanical Engineering
on May 12, 2017, in partial fulfillment of the
requirements for the degrees of
Master of Science in Mechanical Engineering
and
Master of Science in Naval Architecture and Marine Engineering

Abstract

As underwater autonomous vehicles become more prevalent, and their missions more complex, a novel means of underwater acoustic communication with respect to source positioning must be developed which takes advantage of the unique nature of sound propagation through the underwater environment while minimizing the number and energy use of the source agents. Through the use of objective functions, a dynamic positioning algorithm was developed to reduce transmission loss from the source agent to a given target as it changes position over time. Objective functions were also developed which govern the behavior of several interacting source agents as a function of user selected operating profile. Simulations in several operating environments show a single dynamic source agent results in overall reduced transmission loss when compared to a static source at a fixed depth over many credible operating scenarios with a target is at slow speeds and moderate initial depth separation. The use of several source agents in a depth zone operating profile yields better results for targets at higher velocity or operating in areas of deeper water.

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